

(2 ) (JOISS)

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# Contents



# Chapter 1

•  
• DB ,



## Chapter 2

# CTD(SBE 911plus)

### 2.1

SBE 911plus CTD Sea-Bird Electronics , WOCE(World Ocean Circulation Experiments) (Kim et al,2000). SBE 9plus underwater unit (main housing, pump and sensors) CTD , , SBE 11 deck unit . , deck unit water sampler button , . 24 . SBE 9plus 1 1 .

SBE 5T SBE 5P (30 /s) 0.4 T-C duct . CTD . T-C duct duct 0.073 conductivity cell . (0.073 ) , SBE 11plus Deck Unit .

### 2.2

#### 2.2.1

##### 2.2.1.1

(resistance) , thermistor ( , signal) . , / / , / thermistor / . time constant(step change , 63% ) 70ms(0.070 ) . SBE9plus underwater unit 24Hz, 0.0417 . Sea bird . Data processing Alignctd .

**2.2.1.2**

2 cm<sup>3</sup>, 30 /s 67ms .  
 time constant 24ms(0.024s) .  
 . , , . SBE11plus deck unit 0.073  
 , primary +1.75scans(24Hz 1.75/24=0.073 seconds) factory-set  
 , thermocline (-0.08 ~0.08 ) .  
 . alignctd .

**2.2.1.3**

(piezoresistive effect) .  
 . 50 .  
 . SBE 9plus , Paroscientific Digiquartz .  
 , .

**2.2.1.4**

SBE 43 membrane , electrode Teflon  
 membrane electrode electrolyte . electrode ,  
 . 20°C time constant( ) 2 , sensor membrane  
 age .

**2.2.2**

SBE 9plus SBE 32 Carousel Water Sampler .  
 (horizontal mount) (vertical mount) ,  
 .

**2.2.2.1 vertical mount**

13 mm, 19 mm Tygon ( Tygon tubing) .  
 . DO 13 mm 9.5 mm  
 Tygon tubing Tygon tubing( 13 mm) . DO  
 conductivity cell Y-fitting .

**2.2.2.2 horizontal mount**

13 mm, 19 mm Tygon tubing . DO conductivity .  
 DO . DO 13 mm 9.5 mm Tygon  
 tubing Tygon tubing( 13 mm) . DO conductivity  
 cell .



### 2.2.3

#### 2.2.3.1 bottom end cap

SBE 9plus bottom end cap pressure port connector 6 ( 4). pressure port primary temperature primary conductivity connecto(JB1, JB2), connector(JB3), secondary temperature secondary conductivity connector(JB4, JB5) , SBE bottom contact switch connector(JB6) . temperature conductivity pin 3 (3-pin) , 3-pin cable( ; 17086, 6) bottom end cap connector(JB1, JB2, JB4, JB5) . JB3 2-pin cable( ; 17133, 7) , 2 Y-cable( ; 17799, 8) .

#### 2.2.3.2 top end cap

SBE 9plus top end cap 2-pin connector(JT1), 3-pin connector(JT4) 5 6-pin connector(JT2, JT3, JT5, JT6, JT7) ( 5). 2-pin connector sea cable( ; 17027, 17028, 17136 , 9) cable JT2, JT3, JT5, JT6 connector . DO (SBE43) 6-pin-4-pin cable( ; 171491, 10) . SBE32 Carousel water sampler JT7 connector 6-pin-6-pin cable( ; 17198, 11) , General Oceanics Rosette water sampler JT4 3-pin-3-pin cable( ; 17196, 17533 , normal polarity, reverse polarity ) . \* SBE 9plus 2-pin connector 3 (JT1, JB3, JB6) JT1 sea cable JB6 CTD 2007 2 SBE 9plus JB6 (female) . JB3 sea cable JT1 (male) 2-pin connector .

## 2.3

### 2.3.1 SEASAVE

seasave CTD , GPS , CTD , display . seasave setup program setup file (\*.psa) ( 12).

#### 2.3.1.1 (Instrument Configuration) : seasave > configure inputs

configuration file , post-calibration

seasave , configuration inputs Instrument configuration ( 3-1), (Open) (Create) (\*.con), 'Modify' . 'Create' , '911/917plus CTD' , "Frequency channels suppressed" 0,1,2 ( 3-2). Frequency . T, C single/dual , dual T, C 0 , dual T & single C 1 , single T, C 2 . T, C frequency ( voltage ) T, C . "Voltage words suppressed" 0~4 ( 3-2), CTD underwater unit (DO, fluorometer, altimeter, nitrate sensor, turbidity-meter ) .

JT2(V0, V1), JT3(V2, V3), JT5(V4, V5), JT6(V6, V7) 8 (2 Voltage . voltage ) ( 3-3), voltage Voltage words suppressed . , JT6 altimeter V6 , 0 Voltage 7 . 0 voltage 7 , 1 voltage 5 , 2 voltage 3 , 3 voltage 1 , 4 . 4

“Computer interface” IEEE-448 RS-232 . Deck unit computer RS-232 .

“Scans to average” . CTD full data 1 , 24Hz SBE911 CTD 24 , 1 1 .

“Surface PAR voltage added” underwater unit PAR Surface PAR . Application Note 11s .

“NMEA position data added” NMEA , NMEA . Pressure (m) , configuration inputs “Miscellaneous” .

“Scan time added” data scan (GMT 1970 1 1 ) . calibration sheet , Free . 3-1 voltage . , Save save as ( ) .

### 2.3.1.2 ‘Serial Ports’

. Deck unit computer 3-6 deck unit (4) SBE11 interface ( RS-232) (7) MODEM CHANNEL(water sampler ) Deck unit ( 3-7) 1 . 9pin 2~3 USB , 9pin USB USB . deck unit (3) . CTD Deck unit underwater unit (8) , NMEA (10) . , port ( 3-8). “CTD Serial port” deck unit (4) com port , Baud rate(9600 19200), data bits (8), parity (None) . “Water sampling port” deck unit (7) com port . “Serial Data Output data port” “Output data to serial port” . “SBE14 Remote display Serial Port” “Send data to SBE14 remote display” . water sampler . “Water sampler type” SBE carosel , “Number of Water Bottles” Niskin bottle Carosel water sampler trigger part ( 3-10) Bottle trigger . , bottle 6 , trigger 12 12 . “Firing sequence” sequential/User input , Sequential bottle firing , User input firing . “Enable remote firing” TCP/IP port computer firing .

Seasave window display (depth, average sound velocity, descent rate, acceleration, oxygen, plume anomaly, and potential temperature anomaly) , . “Latitude when NMEA is not available” NMEA navigation Seasave pressure depth depth . NMEA . ‘OK’ configuration file .

### 2.3.1.3 Water Sampler

Configure Inputs Water Sampler ( 20). Water sampler type SBE Carousel . Number of Water Bottles carousel bottle (24 carousel 20 bottle 24 ). Firing sequence User Input (Sequential firing bottle firing )

### 2.3.1.4

Configure Outputs SBE11plus Alarms ( 21). altimeter Enable altimeter alarm . Alarm set point(meters) altimeter .

### 2.3.1.5 (Display)

Window display sea-save . 4-1 Fixed, Scrolled, Plot display , 1 , 1 display , 0 .

Fixed display  
Fixed display ( 4-1 4-2) Scan number, Pressure(db), Depth(salt water, m), Temperature (ITS-90), Potential temperature(ITS-90), Salinity, Dissolved oxygen(ml/l mol/kg), altimeter , pump . Fixed display 'Modify' . 'Modify' (pump on/off), , Font size small/medium/large , 'Add' ( ), 'Insert' ( ), 'Change' ( ) , 'Delete' . "Seconds between updates" Fixed display . 0 , 1 1 . 0 . Fixed display 'Export display setting' .

Scrolled display  
Scrolled display Fixed display vertical column ( 4-3). Fixed display . Scrolled display 'Modify' . "Rows to display" (row) ( 40) , "Total rows" ( 200) . Rows to display< Total rows scroll bar , Rows to display= Total rows scroll bar . Altimeter . "Seconds between updates" '0' .

Plot display  
Plot display plot 5 (1 Y 4 X 1 X 4 Y) display . ( ) . 'Plot Setup' ( 4-4). "Number of seconds between plot updates" ( 0 plot ), "Plot type" Single X-Multi Y Single Y-Multi X( ) , "Number of Axes" plot 2~ 5 , "Title" plot title . "Font size" plot small/medium/large . "Enable upcast line colors" downcasting upcasting . , "Minimum pressure to determine upcast" "Pressure decrease to determine upcast" . Minimum pressure to determine upcast pressure pressure , pressure pressure "Pressure decrease to determine upcast" upcast . "Minimum

~" 300 , "Pressure ~" 30 , CTD 300 dbar , pressure  
 310 dbar 280 dbar upcast line ."Bottle display" "Show bottle  
 lines" plot firing bottle number line . "Show fire sequence"  
 plot bottle . "Mark line display"  
 . "Configure outputs" "Mark variables"  
 , "Mark scan control" . "Mark scan control"  
 "Mark scan" Mark line \*.mrk . "Redraw buffer size"  
 buffer scan , "Queue size limit" queue scan , Sea-bird 4000, 10  
 . "Grid line use" plot grid (Horizontal and Vertical ), "Grid  
 line style" plot grid line style (dotted Line ) , plotting data grid  
 "Grid in front" . 'Y-Axis' . 'X-Axis 1' potential  
 temperature 4-5 . "Auto page this axis" ,  
 . plot depth  
 . 2500m , plot display Y-Axis depth Auto page depth  
 0~500 , X-Axis descent rate altimeter , 500m descent  
 rate(CTD . ), altimeter data( ) . 4-6 plot .

Bottle firing display

Bottle firing control ,

"Fire button" Bottle firing . firing

Bottle firing

bottle firing ,

Bottle firing Deck unit "Water sampler control"

LED on/off 5

bottle firing

### 2.3.2

SBE 9plus (profiling rate) 0.5 2 m/s . (data quality)  
 (profile resolution) 1 m/s . CTD (sea state)  
 . turbulent wake CTD CTD  
 ( ; 10 20 cm/s) . CTD T-C duct  
 downcast data upcast data . T-C duct  
 . CTD CTD CTD  
 (3 4 ) (soak) . CTD  
 . winch wire CTD kink carousel  
 CTD drag kink . 100 200 kg( ) drag

### 2.3.3

configuration file ,

"Data Archiving Options" Begin archiving data immediately ( ),  
 Begin archiving data when 'Start Archiving' command is sent (Real-time Date  
 Start-Archiving ), Do not archive data for this cast ( )  
 real-time display ) . ( 3-12)  
 "Output data [.HEX] file" . Do not archive data for this

```

cast
  "Configuration Options"      configuration      . Configuration input

  "Timeout in seconds at startup"      scan data      ( )      , data
      . 'Start'      waiting      display (
3-13) computer      deck unit      underwater unit      ,
error      . 10
  "Timeout in seconds between scans"      scan      scan      gap
  ( )      , scan      seasave      . 10      .
  'Start'      .      "Header information"      display      ,      'Ok'
      .      '*.hdr'      .      "Header information"

  "Don't include Header information in file"      . "Header information"
format

      .      "Data Archiving Options"      Begin archiving data when 'Start Archiv-
ing' command is sent

      : 'Start'      Deck unit power on      ,      deck      'Stop'
      Deck unit power off      .      'Stop'      Deck unit

      .

      window      display      .      "Data Archiving Options"
Begin archiving data when 'Start Archiving' command is sent      ,
display      .      "Data Archiving Options"
Begin archiving data immediately

      ,      , Deck unit power off      .      .hex .dat      .
Rawdata      SBE911plus CTD Seasave 6.0      .dat
      (SBE911plus CTD      CTD SBE911plus CTD Seasave 7.0      )
.hex      .

```

### 2.3.4

- CTD ( 44).
- 0.1% Triton X-100 T-C duct inlet 0.1% Triton X-100  
Conductivity cell ( 45). (× 0.1% Triton X-100 DO  
drift . DO 0.1% Triton X-100  
cast DO 0.1% Triton X-100 . DO  
conductivity cell conductivity cell (Tyhon tube, 46 A)  
0.1% Triton X-100 (flush) cast .  
0.1% Triton X-100 DO 0.1% Triton X-100 conductivity cell  
DO (A ) flushing .)
- (Fig 46 B) DO conductivity cell .( × conductivity  
cell cell CTD .)
- 500-100 ppm Tygon conductivity  
cell ( 47). ( ) T-C duct  
cell ( 34 ). (×  
) cell Tygon .)